

CLAIMS

What is claimed is:

1. A surface lighting device for a display device, comprising:
a light guide plate having a light incident surface;

a point light source opposite to the light incident surface; and

a micro-lens located between the point light source and the light incident surface, for collimating divergent rays emitted from the point light source into parallel rays;

wherein the light guide plate and the point light source are placed at respective working distances from the micro-lens, whereby the divergent rays emitted from the point light source are coupled into the light incident surface via the micro-lens.
2. The surface lighting device as described in claim 1, wherein the micro-lens has a superconic cross-section.
3. The surface lighting device as described in claim 1, wherein the micro-lens comprises a plane surface facing the point light source and a convex surface opposite to the light incident surface.
4. The surface lighting device as described in claim 1, wherein the micro-lens comprises a concave surface facing the point light source and a convex surface opposite to the light incident surface.
5. The surface lighting device as described in claim 1, wherein the point light source is a light emitting diode or a miniature bulb.
6. The surface lighting device as described in claim 1, wherein the light guide

plate is parallelepiped-shaped, wedge-shaped, or has a triangular profile.

7. The surface lighting device as described in claim 1, wherein the light guide plate further comprises a light output surface adjoining to the light incident surface, and a bottom surface opposite to the light incident surface.
8. The surface lighting device as described in claim 7, wherein the bottom surface has a dot pattern thereon, or has a plurality of v-cut grooves therein.
9. The surface lighting device as described in claim 7, wherein the light incident surface has an anti-reflective film thereon.
10. A liquid crystal display device comprising:
 - a liquid crystal panel; and
 - a surface lighting device arranged under the liquid crystal panel for illuminating the liquid crystal panel, the surface lighting device comprising:
 - point light sources for emitting light beams;
 - a light guide plate having a light input surface for receiving the light beams and a light output surface for emitting the light beams; and
 - micro-lenses for coupling the light beams from the point light sources into the light incident surface;
 - wherein the micro-lenses are positioned between the point light sources and the light incident surface, and the light beams emitted from the point light sources are coupled into the light incident surface via the micro-lenses;
11. The liquid crystal display device as claimed in claim 10, wherein the micro-lenses collimate the light beams from the point light sources such that the

light beams coupled into the light incident surface are substantially parallel.

12. The liquid crystal display device as claimed in claim 10, wherein each of the micro-lenses has a superconic cross-section.
13. The liquid crystal display device as claimed in claim 10, wherein each of the micro-lenses comprises a plane surface facing the point light source and a convex surface opposite to the light incident surface.
14. The liquid crystal display device as claimed in claim 10, wherein each of the micro-lenses comprises a concave surface facing the point light source and a convex surface opposite to the light incident surface.
15. A surface lighting device for a display device, comprising:
 - a light guide plate having a light incident surface;
 - at least one light source opposite to the light incident surface; and
 - a lens located between the light source and the light incident surface, for collimating divergent rays emitted from the light source into non-divergent rays;wherein the light guide plate and the point light source are placed at respective working distances from the lens, whereby the divergent rays emitted from the light source are coupled into the light incident surface via the lens.
16. The light device as described in claim 15, wherein said coupled non-divergent rays are essentially in a parallel manner.
17. The light device as described in claim 16, wherein said rays in the parallel manner are perpendicular to said light incident surface.